

**Jobs Through Recycling
2000 National Recycling Market Development Roundtable
New York, NY
March 30-31, 2000**

THURSDAY, MARCH 30

Welcoming Remarks and Overview

John Leigh, U.S. Environmental Protection Agency

Mr. Leigh welcomed everyone to the roundtable, noting that the event was designed to encourage active participation by all attendees. He added that the roundtable included approximately 120 participants, representing states, nonprofit recycling organizations, private companies, and regional and local groups. He added that the roundtable would also address a local issue—offering a session on the opportunities for recycling market development in light of the closing of New York City’s Fresh Kills landfill.

Steve Hammer, Center for Economic and Environmental Partnership

Mr. Hammer made additional introductory remarks on behalf of the Center for Economic and Environmental Partnership, a new nonprofit organization and co-sponsor of the event. He noted that New York City’s 29-acre Fresh Kills landfill is scheduled to close on December 31, 2000. Its closing presents a valuable opportunity to promote recycling market development. Once the landfill closes, New York City expects to pay export costs of between \$500 and \$600 million per year, which makes recycling much more cost-competitive. As co-chair of the city’s citizen recycling advisory board, he is looking to the JTR community for input on how solid waste is handled in the city. He is interested in changing the city’s economic development emphasis to recycling manufacturing and building a sustainable reuse/remanufacturing industry in the city.

Keynote Speaker

Anthony Pratt, Visy Paper

Visy Paper manufactures paper products containing 100 percent post-consumer recycled content. It is the largest privately owned paper and packaging company in the world. Based in Australia, the company employs 5,000 people worldwide at 40 corrugated container plants and 10 paper mills.

Given the variety of environmental and public health issues today—ozone depletion, polluted waterways, climatic changes, global warming—Visy Paper believes the future belongs to companies willing to commit to sustainable business development. The company’s mills use a variety of technologies to minimize environmental impacts and use resources efficiently, including closed water systems and fractionation.

Visy's approach is to harvest the "urban" forest, converting waste paper into jobs for inner cities. Mr. Pratt noted that 4 billion trees are cut each year just to make paper and that paper waste comprises 40 percent of every landfill. He also noted that in the United States, paper is recycled at a rate of 20 percent versus 80 percent in other countries. Visy has helped prove it is possible to make high quality recycled-content paper.

Visy decided to locate a paper mill in New York City because the mayor was willing and determined to bring them there. Today, the company's paper mill on Staten Island, New York, handles 38,000 tons of paper generated each day by the city. The facility has created 200 full-time jobs and 1,000 temporary jobs during construction. It cost Visy \$200 million to build its paper mill in New York City. The company received tax exempt bonds to fund \$150 million in loans, \$42 million in incentives, \$28 million in tax breaks, and \$30 million in other loans. The city pays Visy \$20 per ton for the paper. Visy's mill in Atlanta cost half as much, with much lower taxes and waste handling and energy costs.

After waste handling costs, energy is the biggest cost for the company. Visy currently pays 4 cents per kilowatt hour at the mill; their goal is to pay 1 cent per kilowatt hour. The Fresh Kills landfill generates large quantities of methane gas, which could be tapped to power the paper mill. Mr. Pratt highlighted a variety of ways that government can assist his operations:

- C Help test the use of sludge by-products as a fuel source. Visy currently pays \$50 per ton to landfill the sludge.
- C Allow Visy to collect more paper to supply the mill, creating a fully integrated operation.
- C Increase disposal costs to make it tougher for those who don't recycle.
- C Buy recycled. Two thirds of the paper purchased by government agencies contains no recovered content.
- C Educate the public about the quality of recycled products and the positive relationship between the economy and the environment.
- C Encourage more recycling companies to locate in the inner city, which would help address the lack of jobs in these areas.
- C Develop an American Institute on Recycling to promote increased recycling. The institute could also spearhead financial incentives for recycling companies, such as tax reductions and incentives.

Q: What are the options for energy savings?

A: The electric utility industry is currently transitioning to utility deregulation, which may provide some opportunities for savings. We are looking into utilizing methane gas from the Fresh Kills landfill; efficient burners could be installed for \$10 million. We are also looking into co-generation.

Q: What's being done currently with the methane gas at Fresh Kills?

A: It is flared under a consent order. Part of the gas is purified and distributed through the natural gas pipeline.

Q: Who provided your company with economic development assistance?

A: We received a combination of grants. One grant helped us deal with our waterfront issues, namely

bringing waste to our facility from Manhattan by barge. We set up a private barging company to deliver paper to our site. Another grant helped us re-establish rail service to the mill. This was part of our pledge to not put extra trucks in the road.

Q: How did Visy Paper thrive while the Bronx Community Paper Company has stalled?

A: We established the Visy mill after 50 years of business history. It was the eleventh mill we built worldwide. We had an established credit history and secured financing. The Bronx project was the first of its kind, bringing together a real estate developer, community group, and paper supplier in a joint venture.

Q: What is the average hourly wage for your employees?

A: We pay an average of \$20 per hour, with incentives for innovation.

Q: How do you suggest increasing landfill tipping fees?

A: It's a difficult issue. We don't have the answers. We're simply asking for others to focus on this issue. We need to provide economic incentives to promote recycling.

Q: Can you describe your overall business operations?

A: We have an integrated recycling system that includes the complete recycling chain—from collection through manufacturing. Our collection efforts yield a good price because of low contamination levels. We are also developing a small but growing plastic recycling business. The government can help our efforts by enacting minimum content standards for recycled products, offering state tax benefits for higher recycled content levels, and supporting buy recycled programs.

Small Group Roundtables: Defining Goals, Problems, Strategies

John Leigh, EPA

In light of budget uncertainties, the JTR program has a renewed emphasis on information sharing and networking. EPA is interested in creating peer-to-peer connections to allow market developers to learn from each other. This session was intended to continue the discussion from last year's roundtable about future directions for the JTR program.

Andrew Reamer, Andrew Reamer & Associates

EPA asked a team of consultants to review the JTR program and make recommendations for how it can continue to move market development forward. The team spoke with 15 states and documented state program strengths, state program challenges, state program weaknesses, barriers to greater recycling market development, the role of JTR to date, and suggested roles for the JTR network. See Attachment A for a summary of the team's findings.

Mr. Reamer presented the findings and then asked the Roundtable participants to form small breakout groups and provide feedback. The following is a compilation of the group's comments regarding the summary of state RMD survey results:

Overall Needs for the Recycling Market Development Community

- C Money, in particular seed capital for assisting small businesses. EPA could look at other funding sources and help link to JTR projects and interests. Recognize this is small business assistance and not funding for larger businesses. Government can serve as an aggressive catalyst for new business startups, especially those without a prior track record.
- C RMD financing.
- C Environmental procurement policies for federal, state, or local government. Implementation and enforcement is needed for those agencies with existing mandates and for executive orders.
- C More convenient means of recycling to increase supply of recyclable materials. Help ensure a steady, quality supply of recyclables for businesses. Address quality and contamination issues with respect to residential and commercial sources of supply.
- C Infrastructure for composting, including overhauling waste management systems to promote composting.

Barriers to Greater Recycling Market Development

- C Lack of economic incentives to recycle.
- C Working with startups; it can be difficult for them to understand market forces.
- C Hidden collection and disposal costs for communities that finance their solid waste management programs out of the tax base. Full cost accounting is a good tool for identifying hidden costs to waste disposal.
- C The misconception that it's easy to do business in certain states.
- C Global material demand issues.
- C Ensuring a high quality feedstock for businesses.
- C Subsidies for virgin materials.
- C Low tipping fees nationwide.
- C Barriers are similar no matter what the scale of area (urban, suburban).

Suggested Roles for JTR: Build Partnerships

- C Increase links between nonprofit organizations, private companies, and government agencies.
- C Work more closely with other federal agencies to find other funding sources and publicizing other grant programs.

- C Partner with the U.S. Department of Commerce (DOC) to facilitate efforts at state level. Work with DOC on international trade issues.
- C Look for synergies with MEPs.
- C Continue to link with other EPA programs that work on material recovery issues.
- C Help involve the private sector in RMD planning efforts. Provide opportunities for input from small businesses.

Suggested Roles for JTR: Promote Peer-to-Peer Interaction/Structured Learning Opportunities

- C Conduct regional workshops and roundtables focusing on regional issues. Sponsor regional in addition to national activities and bring industry groups together to address specific commodity issues.
- C Hold satellite conferences on specific topics.
- C Promote recycling and remanufacturing awareness at industrial design and architecture schools especially in state university systems.
- C Provide “hand holding” for smaller businesses.

Suggested Roles for JTR: Provide Information Assistance

- C Develop linkages to hot topic areas such as climate change, industrial ecology, sustainable development/smart growth. Redefine and refocus the JTR mission to fit within the goals of these broader environmental programs, but recognize limitations. For example, industrial ecology is only useful if it can be translated into business opportunities.
- C Keep information current and maintain list server to foster ideas and information exchange. Encourage more people to respond to the list server to enable more archiving.
- C Perform an inventory of all research and studies on RMD in all states. Provide a clearinghouse of technical assistance information.
- C Promote innovative R&D/new technologies.
- C Provide an accessible database of information for all to use.
- C Develop RMD toolkits covering selected topics.

Suggested Roles for JTR: Build the Case for Recycling Market Development

- C Measure and track results.
- C Refocus market development to look at things from the top down; study how successful companies became successful.
- C Better understand the specific steps to bringing new products to market.
- C Recognize that economic developers are not interested in the environmental benefits of recycling, only the financial side.

Suggested Roles for JTR: Support Recycling Markets Policy Development

- C Redefine goals for educating the public on buying recycled at the state and local level. Develop stronger state mandates versus goals for buying recycled.
- C Offer economic incentives to reduce, reuse, and recycle.
- C Provide disincentives for landfilling.
- C Track legislation on specific issues such as lead based paint.
- C Examine policy issues such as tax incentives, legislative mandates, minimum content standards, and extended producer responsibility.
- C Review policies that reduce subsidies for virgin materials.
- C Avoid trying to influence market prices.
- C Emphasize the 35 percent recycling goal and work with states with low percentages.

Suggested Roles for JTR: Support Recycling Infrastructure Development

- C Increase participation to drive down costs per ton and identify incentives to boost participation. Address reduction of collection costs.
- C Explore source separation versus commingled collection and what makes the most sense for different commodities.
- C Address infrastructure needs in rural areas and less populated states.
- C Encourage market restructuring with respect to hauling companies.
- C Emphasize market development at the state level more than supply development (i.e., demand pull versus supply push).

- C Enhance post-industrial waste recycling efforts that involve sustained viable existing businesses.
- C Help identify funds for textile scrap RMD.
- C Help overcome product development hurdles.

Small Group Discussions

The group then broke into small groups to discuss current activities, barriers, and opportunities related to a wide variety of topics: business assistance, business attraction, feedstock conversion, new product development, product stewardship, buy recycled promotion, and information assistance. See Attachment B for the results of these discussions.

Concurrent Commodity Workshops: Developing the Infrastructure

Electronics Recycling

Patty Dillon, The Gordon Institute, Tufts University

Ms. Dillon noted that the purpose of the session was to provide an overview of U.S. electronics reuse and recycling, including challenges, successes, and current recycling rates. She gave the presentation in place of Dawn Amore of the National Recycling Coalition (NRC), who was unable to attend the roundtable. She also led a focused discussion about ongoing state activities and ideas for improvements.

NRC's Electronics Recycling Initiative was created by the recognition that the U.S. faces an increasing stockpile of unused, unwanted electronic equipment. The initiative, funded by EPA and the U.S. Postal Service, recently published a report on electronics recycling. To collect the information, NRC surveyed 123 electronics recycling firms. The report covers a range of equipment, including desktop personal computers (CPUs), mainframe computer CPUs, workstation computer CPUs, cathode ray tube (CRT) computer monitors, and more.

The report highlighted the following:

- C The diversity of the electronics recycling industry, with firms engaged in a wide variety of recycling activities including scrap metal, acid recovery, equipment manufacturing, precious metal refining, and integrated chip recovery operations.
- C The industry is dominated by original equipment manufacturers (OEMs) who run or manage their own operations and can afford to make large capital investments. In fact, five firms are recycling more than all of the other companies combined.
- C Most electronics are recycled in the midwest, followed by the midatlantic region.
- C In 1998, 2.3 million desktop PC units were recycled (11 percent recycling rate), followed by 1.5 million CRT monitors (10 percent), and 2.9 million computer peripherals (26 percent). Other materials such as TVs and mainframes were recycled at much lower rates.

- C Most electronics are recovered by equipment manufacturers and large firms because they have the infrastructure and relationships to do so.
- C In 1998, 275 million pounds (9.7 million units) of electronic products were recycled. The total volume in 1997 was 268 million pounds (9.4 million units).
- C Of the electronics materials recycled in 1998, steel was largest at 43.9 million pounds, followed by glass (29.2 million), plastic (14.4 million), aluminum (9.9 million), copper (7.9 million), and precious metals (2.2 million).
- C In 1998, reuse organizations recycled 585,000 desktop PCs (3 percent), 380,000 CRT monitors (2 percent), and 160,000 computer peripherals (1 percent). Most of the equipment is distributed to schools, nonprofit organizations, and small businesses. Schools, however, are increasingly demanding multimedia computers. In addition, computers are often outdated by the time they are released.
- C The average lifetime of PCs is falling: from 4.5 years in 1992 to an estimated 2 years in 2005. This is creating a growing supply of used PC equipment, with nearly 30 million PCs becoming obsolete in 2000 alone.
- C Although the U.S. electronics recycling rate is rising, the obsolescence rate is rising, too. Of the 20.6 million PCs that became obsolete in 1998, only 11 percent were recycled. Compared to the 36.7 million new PCs shipped from manufacturers in 1998, only 6 percent were recycled. For major appliances, the ratio of units recycled to units shipped was about 70 percent.
- C In summary, there is a low rate of recycling relative to product obsolescence, a lower rate relative to shipments, the industry is still developing (20 companies exited in 1998 and 1999), and the greatest challenges are CRTs and plastics.

Q: What is the role of exports?

A: The NRC report did not address exports, although a significant amount of electronics equipment is exported, particularly to Canada. A recent report discussed problems with exports to countries such as China, Korea, and Vietnam. China will soon ban the import of electronics scrap materials.

Q: What about other electronics materials besides computers?

A: The report focused on computers because they are the most commonly recycled type of electronics equipment.

Q: Did the report address the value of precious metals versus the health risk of extracting these materials?

A: No, the study was intended to provide baseline data for electronics recycling. It did not address these types of issues. The presence of precious metals is a major incentive for collecting electronics equipment, however, particularly for larger firms.

Q: Now that your organization has collected this data, what's next? Are there efforts underway to work with manufacturers to take items back?

A: There are efforts to work with manufacturers in a voluntary, cooperative manner. NRC is working

in this area through its grassroots network. Some companies are looking into leasing rather than selling their equipment. This establishes a mechanism for them to take back their own computers. Other efforts are underway to put pressure on PC manufacturers to take items back.

Q: Does the technology exist to make remanufacturing electronics equipment cost-effective?

A: It depends on the product. Some companies, such as Xerox, have made remanufacturing a priority; in addition, Xerox puts a strong emphasis on design for remanufacturing. PC technologies are uncertain because the industry is changing so quickly.

A: Hewlett-Packard (HP) has an extensive computer recycling program at its Rosewood, California facility. At this site, the company recovers what it can and provides excess service parts to other organizations. They have not found markets for a number of materials, however, including plastics. General Motors takes back its vehicle and automotive electronics.

A: The NRC Electronics Report uses a broader definition of recycling than typically is used by NRC (including materials that had merely been recovered and processed as “recycled”). This is because the report was initiated at the National Safety Council. Had the full report been completed at NRC, the definition of recycling would have been different.

Overview of Markets and Challenges in Recycling CRTs and Plastics from Electronics

Patty Dillon, The Gordon Institute, Tufts University

Ms. Dillon’s presentation focused on CRTs and plastics, two materials that typically cause problems in electronics recycling. The session also included a discussion on state electronics recycling activities.

The presentation began with a discussion of CRTs:

- C CRT color monitors contain 8 percent lead by weight, although the lead content varies by component in color CRTs. The lead content in monochrome monitors is different.
- C Currently, TV monitors, TVs, and CRTs can be reused. Recycling options include either closed or open loop glass-to-glass systems, lead reutilization, or glass aggregate since the silica serves as a replacement for sand. CRTs can also be exported for reuse and/or recycling (e.g., pesticide bottles).
- C The Chelsea Center for Recycling and Economic Development published a report entitled, *Potential Markets for CRTs and Plastics from Electronics Demanufacturing: An Initial Scoping Report* located at <www.chelseacenter.org/techreptsdesc.htm##6>. It classifies different CRT recycling options, including types of materials accepted. The hazardous nature of the lead in CRTs is the most significant issue since it affects how the materials are processed and related costs.
- C The two most prevalent applications include closed loop glass-to-glass recycling and smelting.
 - Driven by CRT glass manufacturers, CRT glass-to-glass recycling directly replaces silica and lead oxide as raw materials in CRT glass manufacturing; both the panel and funnel can be recycled (although they have different lead compositions). This market has a capacity of approximately 150,000 to 300,000 tons annually; in 1997, only 10 to 15 percent of the capacity was utilized. The

major limitation relates to the glass chemistries. Collection fees range from \$3 to \$10 per unit; the materials have a commodity value of 50 to 70 percent of corresponding virgin raw materials. Benefits include reducing manufacturing costs and improving glass processing and product quality.

— CRT glass can also be used as a fluxing agent in the smelting process and used as a replacement for silica (e.g., sand). The major limitation is that not all smelters recover lead from CRT glass (lead smelters do while copper smelters do not). The benefit is that no glass sorting and, in some cases, no demanufacturing is required. Major end markets include Doe Run in Missouri and Noranda in Canada.

Q: What are the possibilities for a certification process for companies involved in demanufacturing electronics?

A: In the United States, the International Association of Electronic Recyclers is looking into electronics certification and standardization. Efforts are also underway in Europe. No one should be expected to be an expert in all areas of electronics. A certification program would be a big step forward; it would help make things more apparent and provide better access to information.

Ms. Dillon then discussed the challenges and opportunities for recycling plastics from electronics equipment:

- C In 1995, telecommunications equipment contained the largest plastics content of electrical and electronics equipment (58 percent), followed by small appliances (35 percent), brown goods (26 percent), large appliances (21 percent), computers (16 percent), office equipment (11 percent), and medical equipment (3 percent).
- C The major resins in computer and electronics housings include acrylonitril butadiene styrene (ABS), ABS/polycarbonate (PC) blends, high impact polystyrene (HIPS), polycarbonate (PC), polyvinylchloride (PVC), and polyphenylene oxide (PPO).
- C The major challenge is that electronics equipment tends to include many different types of plastic resins that are difficult to identify and sort. The plastics are also typically fixed to other equipment parts which leads to contamination. The plastics also are not labeled consistently because many products are developed overseas.
- C To facilitate plastics recycling, Tufts University is fostering stakeholder dialogue. Through a series of meetings, Tufts University has brought the supply chain together to help increase understanding of perceptions and requirements, develop an industry network to share experiences and stimulate new partnerships, and develop collaborative industry solutions to recycling engineering thermoplastics from used electronics. Tufts is demonstrating a “shared product responsibility” model as an alternative to “producer responsibility.” This project is funded by the Chelsea Center for Recycling and Economic Development and EPA.
- C Positive developments include increased availability of some recycled-content resins, qualification and use of recycled content resins in high performance applications, and technical developments in identification, cleaning, and sorting.

- C Barriers include the economics of sorting and processing mixed resins to compete with virgin pricing, continuity and volume of supply, lack of ownership within the supply chain, and lack of recycled-content feedstock specifications to facilitate market development.
- C Future needs include increased product recovery and resin consolidation to achieve volumes needed for cost-effective processing, continuity of supply, and market development. Also, there is a need for identifying and developing additional markets, particularly for mixed plastic resins.
- C Examples of market applications for the recovered plastic range from low quality (e.g., road aggregate) to high quality (e.g., electronic housings and internal parts).

Q: A recent report claims that brominated flame retardants in computer equipment pose a potential health risk as they can accumulate in the blood stream of workers at facilities. What is being done to address this issue in the United States?

A: Some resins actually have natural flame retardant properties; others require the addition of flame retardants. This issue has not been acted upon in the United States; it is more prevalent in Europe as part of the EcoLabel programs.

Ms. Dillon then led of a discussion of state electronics recycling efforts, focusing on the different approaches taken, lessons learned, and successes to date.

Minnesota

From July to October of 1999, Minnesota conducted an electronics demonstration project to test different collection strategies as well as high-end recovery options. During the course of the project, 30 counties in Minnesota ran different types of electronics collection programs, ranging from curbside collection to staffed drop off sites to neighborhood cleanups. The program involved 7,500 participants and collected 151 pounds per person, which translates to approximately 1,150,000 pounds of material. The majority of material was wood waste and TVs. Of this total, 87 percent was recovered for recycling and reuse.

To better understand the waste composition, Minnesota sent 5,000 pounds of material to MBA Polymers to conduct a waste characterization study. MBA Polymers was also tasked with identifying market opportunities for the material. Minnesota will be publishing a report with the findings of the project this spring. Additional information on the project is available at <<http://www.moea.state.mn.us/plugin/index.cfm>>. The state is currently pursuing a non-regulatory approach to electronics recycling; the governor has given industry 12 months to demonstrate that it can be done without legislation. Otherwise, the state may consider legislation such as landfill bans of certain materials.

Louisiana

In Louisiana, the Corporate Recycling Council recently began exploring computer recycling and reuse opportunities. More specifically, the state is interested in taking surplus computers from government agencies and providing them to high schools, vocational technical schools, and correctional facilities. The state has also begun to look into recovering other materials such as CRTs.

New Jersey

Through a 1996 JTR grant, New Jersey worked to establish an electronics demanufacturing program in the state. Several communities participated and offered a variety of electronics collection programs to citizens, including curbside, drop off, and HHW collection days. The project involved 500,000 people in different municipalities. The purpose of the program was to divert significant quantities of electronics waste from the area's incinerators. The grant project also looked at opportunities to reduce the cost of electronics recovery. As a result, New Jersey joined EPA's Common Sense Initiative and is working to establish a universal waste designation for CRTs. As a result of these efforts, there are now six facilities that accept electronics materials recovered by the state and other communities are interested in getting involved.

A second JTR grant allowed New Jersey to focus on plastics recycling. The state conducted research with Rutgers University to identify different types of plastics in electronics disassembly and test the physical and chemical properties of the materials. New Jersey is also working with Princeton University to look into material composition issues. A variety of companies are participating in and providing in-kind support to the project, including Sharp, Panasonic, and Lucent Technologies.

Massachusetts

Beginning April 1, 2000, Massachusetts banned CRTs from its landfills. In addition, Massachusetts has established six regional electronics collection facilities around the state; other reuse centers and nonprofit organizations also collect used computers for reuse. Those items that cannot be reused are processed and remanufactured into new products. Massachusetts also provides grants to 113 municipalities to facilitate electronics reuse. To date, grants have been used to establish curbside collection programs, hire vendors to collect the materials, and fund 1-day drop off programs. Massachusetts also has provided grants to plastics and CRT recyclers. To help facilitate the reuse of electronics equipment, Massachusetts exempts intact CRTs from the state's hazardous waste requirements.

Oregon

Oregon is looking into the universal waste rule for CRTs. There are currently five small independent companies that remanufacture computers for recycling in Oregon. In addition, some local government programs collect electronics equipment at neighborhood cleanup and collection events and the state's annual cleanup day. Students Recycling Used Technology (STRUT), a consortium of educational institutions, takes back computers from commercial and residential sources and sends them to schools in Oregon for reuse. In addition, at some schools students learn to demanufacture the computers in order to help develop technology skills.

New York

In New York, there is a state law regarding sending computers and electronic materials to schools and non-profits. The New York State Economic Development Corporation (EDC) has also provided a grant to an electronics recycling firm in Schenectady. Mr. Ed Campbell, formerly with the EDC, spoke about his new organization, Per Scholas. This New York City-based organization collects used computer equipment, refurbishes the equipment, and sells it to schools for \$250 per computer (it costs \$150 to produce them). All computer equipment is donated. The organization provides computer technician training to 150 at-risk young adults in the South Bronx. The 6,000 square-foot operation can process 1 million computers annually. One challenge is handling the CRT glass in computers because it contains lead; they are hoping to get a hazardous

waste variance on processing CRT glass. They are working with groups such as the National Urban League to increase sales and distribution. Visit <www.perscholas.org> or call 718 292-2300 for more information.

Q: Are there any model specifications to ensure that electronics materials are being recycled?

A: In New Jersey, all manufacturing facilities are required to register with the state. This provides the state with sources of input and end products. The state follows up with on site visits or phone calls to make sure the information submitted is accurate. Another option is to add a purchase preference for recovered electronics into state contracts. Puerto Rico, for example, allows a 50 percent price increase for all government purchases of recycled-content products.

Q: Can you provide a cost estimate for an electronics recycling program?

A: It depends on whether it is a curbside or drop off program. Visit EPA's Web site on Extended Producer Responsibility at <www.epa.gov/epr> for more information.

A: New Deal is a new company that has developed a \$99 compact software suite to upgrade old computers and make them Internet-ready and e-mail accessible. For more information, visit <newdealinc.com> or see the latest newsletter from the Reuse Development Organization (ReDO).

Market Development for Food Residuals

Brian Armstrong and Matthew Christmas, Hilton at Short Hills

The speakers described their food waste recovery operation at the Hilton hotel in Short Hills, New Jersey:

C To kick off the program, the hotel held individual and group training sessions for stewardship professionals, chefs, and wait staff.

C At the hotel, the food residuals are collected in 20-inch by 20-inch carts which is an optimal size because it is just below counter height.

C A full-time steward is dedicated to managing the bins, including cleaning and storing the bins and overseeing food waste pickup days.

C The program is financially beneficial, generating 20 to 30 tons of food waste per month at \$50 per ton.

Q: How did you get started with food waste recovery?

A: It was driven internally; our general manager wanted to save money and hired an outside firm to do an analysis of our food waste recovery options.

Q: Is Hilton doing this on a corporate level?

A: Not at this time, but it will probably evolve to a more long-term focus within the company.

Q: What's being done with the food waste?

A: The food waste is being turned into animal feed and various other food waste products.

Thomas Outerbridge, CityGreen, Inc.

CityGreen, Inc., is currently vying for a long-term contract to handle all of New York City's food residuals. Mr. Outerbridge described the following:

- C In order to collect food residuals in New York City, a collection and processing infrastructure is needed. Collection, in particular, is costly because collection rates are structured by volume and food is heavy.
- C Food waste currently constitutes 15 percent of the commercial waste stream. The city's eating and drinking establishments generate 800 tons per day of food residuals alone. Food stores and food wholesalers are the next largest source.
- C CityGreen, Inc., is focusing on collecting 20,000 tons per day equally split between the residential and commercial sectors.
- C Curbside yard waste collection costs New York City \$5 million per year. As an alternative, backyard composting programs should be promoted.
- C Most food residual programs are restricted to only taking vegetative waste.

Q: How are hauling rates affecting the ability to collect food residuals?

A: Tipping fees are now approximately \$50 per ton for commercial waste. It cost \$50 per ton to collect food residuals, which is close to the break event point. There are fundamental issues with the rate structure, however, which create disincentives to food waste recovery.

Dr. Michael Westendorf, Rutgers University

- C Food residuals comprise 10 percent of MSW which translates into 12.5 million tons per year in the United States. New Jersey generates 891,000 tons per year of food waste. Approximately 20 to 25 percent of food is wasted.
- C Food residuals are generally nontoxic, contain high levels of protein and fat, and have favorable mixtures of minerals and vitamins.
- C Types of food waste include plate wastes, dairy processing wastes, fish wastes, brewing byproducts, and dairy processing byproducts.
- C Problems with food residuals include high moisture content.
- C Nutrient composition of food waste includes dry matter (22 percent), fat (14 percent), and ash (3.2 percent).
- C Types of food waste fed on New Jersey swine farms include bakery waste, vegetable waste, and fish waste.

- C Currently, 33 states allow the feeding of plate wastes to swine, 17 states have banned it (including New York), and the federal government requires plate waste to be cooked. Cooking requirements include the Swine Health Protection Act of 1980. A recent U.S. Federal Drug Administration rule will allow the feeding of food plate waste with no limitations for swine.
- C New technologies for processing food residuals include pelletizing, dehydration, and chemical processing.
- C In summary, while there is much potential for recovery of food residuals, there are concerns that the nutrient content and moisture levels of food residuals may limit its use for animal feed.

John Majercak, Center for Ecological Technology

The speaker described the Greater Boston Food Waste Recycling Project:

- C The project involved collecting food residuals from supermarket chains and restaurants in the Boston area and producing a compost for local farmers. The large majority of materials were collected from supermarkets because it proved too costly to collect residuals from restaurants. To begin, the center conducted outreach to farmers to find a market for the finished product. In total, it took approximately 3 to 4 years to get the program up and running.
- C The project has found that stores can save up to 25 percent of their disposal costs by collecting and marketing their food residuals.
- C Plastic was a major contaminant problem; the center manually removed the plastic from the loads. Also, a lot of waxed corrugated containers contaminated the loads, but this was not a problem since the material can be composted.
- C The center identified a number of challenges to food waste recovery, including improving the economics of the operation. High tipping fees helped improve the economics of the project in Massachusetts, but will vary from region to region. Overall, the center concluded that most barriers can be overcome.
- C The center plans to publish a report with its findings in June 2000.

Q: Can these types of projects be sustainable without outside assistance?

A: Yes, but not for all farms. The key is having a diverse program. Avoided disposal costs are not enough to make the program cost-effective.

Concurrent Panel Sessions: Business and Technical Assistance

Resources and Tools for Financial, Technical, and Markets Information

Andy Reamer, Reamer and Associates

Mr. Reamer described information resources for market information in the following areas: technology development, business development, environmental focus, and commodity-specific resources.

Technology Development

- C Community of Science <www.cos.com/services/>. Lists federal and nonfederal funding options.
- C National SBIR/STTR Conference Center <www.zyn.com/sbir>. EPA's SBIR program is interested in receiving proposals from small recycling businesses; each year, EPA has a different area of focus.
- C National Technical Information Service <www.ntis.gov/search.htm>. A service of the U.S. Department of Commerce, this site allows users to search all research funded by the federal government since 1990.
- C Science and Engineering Library, University of California-San Diego <scilib.uscd.edu/subjectdir/patents.html>. Provides patent information for technical areas of interest.
- C National Technology Transfer Center <www.nttc.edu/products/products.asp>. Part of NASA's technology transfer mandate, allows users to search federal research in progress for a subscription fee.
- C Federal Laboratory Consortium (FLC) for Technology Transfer <www.federallabs.org>. Provides access to over 700 federal laboratories with a mandate to promote technology transfer. The FLC Locator allows users to identify experts and arrange for cooperative research agreements. EPA's Region 5 helped a Wisconsin molded pulp packaging company access experts in the U.S. Forest Products Lab to develop more efficient molds.
- C Federal Lab Resource Search <www.zyn.com/sbir/sbres/sbfr.htm>. Provides access to federal laboratories.

Business Development

- C Local SBA Resources <www.sba.gov/regions/states.html>. Provides access to small business development centers (SBDCs), export assistance centers, capital centers, and small business investment centers (SBICs).
- C BusinessLINC <businesslinc.sba.gov>. A business mentoring program linking entrepreneurs with service providers.

- C Manufacturing Extension Partnership (MEP) <www.mep.nist.gov/index3.html>. Coordinated by the National Institute of Standards and Technologies (NIST), offers technical expertise to companies.
- C Entrepreneurship Web sites <startup.wsj.com> and <garage.com>.
- C Capital Search Tools include America's Business Funding Directory <www.businessfinance.com> and the Venture Capital Resource Library <www.vfinance.com>.
- C Sustainable Jobs Fund <www.sjfund.com>.

Environmental Focus

- C EPA Environmental Technology Commercialization Center <www.etc2.org>.
- C Environmental Technology Evaluation Center <www.cerf.org/evtec/>.
- C Sustainable Technology Division, National Risk Management Research Laboratory <www.epa.gov/ORD/NRMRL/std/cppb/>.
- C DOE Inventions and Innovations Program <www.oit.doe.gov/inventions>.
- C DOE NICE3 <www.oit.doe.gov/nice3/>. Funds state and industry partnerships for clean production technologies. Works collectively to accelerate deployment of technologies to reduce waste and energy use.
- C DOE Industries of the Future <www.olt.doe.gov/industries.shtml>.
- C WasteWise <www.epa.gov/wastewise>. An EPA partnership program designed to help companies reduce, reuse, and recycle waste and buy recycled content products.
- C ClimateWise <www.epa.gov/climatewise>.
- C EnviroSense <es.epa.gov/>.
- C Center of Excellence for Sustainable Development <www.sustainable.doe.gov/>.
- C Minerals and Materials Analysis, USGS <minerals.usgs.gov/minerals/pubs/index.html>.
- C Eco-Industrial Park Plan Tools, 202 260 7568.
- C State Impacts of Global Warming <www.epa.gov/globalwarming/impacts/stateimp/index.html>.
- C Brownfields Economic Redevelopment Initiative <www.epa.gov/brownfields>.
- C Sustainable Development Challenge Grants <www.epa.gov/ecocommunity/sdcg/>.

Wood Products

- C Conservation and Recycling Technology Marketing Unit, USDA Forest Products Laboratory <www.fpl.fs.fed.us/rwus/fpcr.htm>.
- C Wood Education and Resource Center, Forest Service <www.werc-hdw.com/index.htm>.
- C Brooks Forest Products Center, Southern Research Station, Forest Service <www.srs4702.forprod.vt.edu/>.
- C Economic Action Programs, Forest Service <svinet2.fs.fed.us:80/spf/coop/eap.htm>.
- C Interagency Council on Biobased Products and Bioenergy <www.bioproducts-bioenergy.gov>.
- C DOE Regional Biomass Energy Program <bioenergy.ornl.gov/rbep.html>.
- C DOE Bioenergy Initiative <www.eren.doe.gov/bioenergy_initiative>.
- C Agricultural Research Service, Manure and Byproduct Utilization Program <www.nps.ars.usda.gov/programs/206b.htm>.

Lou Jakub, U.S. Army Federal Labs Consortium

The FLC was established in 1975 to create a nationwide network of federal laboratories to transfer technologies from the federal to the private sector. The FLC consists of 711 federal laboratories and one-sixth of U.S. scientists and engineers. The FLC conducts approximately \$25 billion in research annually. The laboratories cover the whole spectrum of research areas—from computers and engineering to medical research. The FLC Locator at <www.federallabs.org> allows users to search for federal laboratories online.

The FLC has a variety of mechanisms to collaborate with the private sector in technology transfer, including collaborative research projects, cooperative R&D agreements, patent/licensing agreements, technical consultations, employee exchange, use of laboratory facilities, personal laboratory visits, and information dissemination.

Mr. Jakub then described a variety of FLC success stories that relate to recycling market development, including:

- C “Surf and Turf” (i.e., crab, shrimp, and lobster shells and corn) produce automobile fuels and lubricants to protect metals from corrosion. Contact Dorry Tooker at 516 344-2078 or <dorryt@bnl.gov> for more information.
- C An innovative process to develop new markets for recovered tires. Contact W. Stanley Anthony at 601 686-3094 or <anthonys@ars.usda.gov> for more information.
- C Food processing waste transformed into high value protein supplement for cattle. Contact Michael Brown at 509 372-4868 or <michael.brown@pnl.gov> for more information.

- C Separation technology to reclaim plastics from obsolete appliances, auto shredder residue, disassembled car parts, industrial scrap plastics, and consumer electronics. Visit <www.techtransfer.anl.gov/techtour/froth.html> for more information.
- C Recovering paper and wood waste at the U.S. Postal Service and finding markets for recycled wood fiber in plastic composites. Visit <www.fpl.fs.fed.us> for more information.

Q: Does the recycling market development community have access to federal laboratories?

A: While every federal lab is different, most will make the facilities available for limited periods of time. If there is a need for more extensive assistance, the labs will typically charge for use of the facility.

Roger Guttentag

Mr. Guttentag publishes a column in *Resource Recycling* magazine called "Recycling In Cyberspace." He noted that he is interested in the Internet as a user not as a Web site developer. He is actively involved in finding high-quality information for recycling professionals.

He proposed a concept to the group for review and critique: a Buy Recycled Advisor Web site. The purpose of the site would be to provide comprehensive information on buying recycled products. The commercially-sponsored page would serve as a portal site to existing sites, offering "one stop shopping" for users. The site would feature the following: vendor/product directories, recycled content news, a marketplace for buying and selling recycled materials, related articles, specifications, files available for download, reviews and product experience, ask the experts with Q&A on specific products, and forums for general discussion among users.

In general, the group liked the idea of a unified site to support buying recycled products. Some noted, however, that it will be difficult to convince manufacturers to support the Web site since there is already so much information available. Others highlighted the importance of promoting the site once it is developed. Another participant noted he favors tools that decentralize information such as the JTR list server. The Arizona Department of Commerce recently bought into an economic development portal page and other state agencies are also looking into it. Another participant asked about the importance of promoting buying recycled relative to other needs. Considering the size of the industry, he was not convinced that buying recycled is what is needed to drive the industry. Another participant suggested that it is a project for the Buy Recycled Business Alliance of the National Recycling Coalition and America Recycles Day. Someone suggested broadening the scope to include environmentally preferable products.

Q: Why isn't this happening already?

A: It has not been funded. There are various existing sites with different parts of the site. For example, the Chicago Board of Trade Recyclables Exchange was a marketplace for buyers and sellers and the JTR site lists state recycling directories. A portal page is a good idea; it should be commodity-driven.

Q: Who is the audience for the Buy Recycled Advisory Web site?

A: Anyone who wants to buy recycled-content products. This differs from the JTR audience, whose main interest is in the processing and manufacturing of recyclables.

Q: What types of information does the JTR community need?

A: Technical processing and manufacturing information, although the subject matter varies depending on the business assisted. Providing contacts in related organizations such as the MEP program. Sponsoring regional meetings to bring together market developers around selected topics. Facilitating peer matching by identifying experts in different areas of RMD; this could include state and local chapters of relevant trade associations.

A: The JTR program is funding the RCRA Region 1 library to develop a database of studies, reports, and resources related to processing and manufacturing recyclables. Under the current design, users will be able to enter an activity (e.g., recycling), input a material (e.g., plastic), and receive various outputs (e.g., park benches, fleece jackets). When completed, it will be incorporated into the JTR Web site.

A: Excellent search engines include <altaweb.com>, <google>, and <northernlight>.

Opportunities for Reuse Business Development

Tom Kacandes, ReDO

- C The New York State Office of Recycling Market Development has supported reuse business development for the past 7 years. The office has also supported the development of ReDO, a national organization working to promote reuse.
- C There are reuse efforts underway across the United States, but they could be much better organized. Opportunities for reuse include furniture (from commercial and residential sectors), materials for schools and the arts, building materials (for disaster relief), household furnishings, clothing (a relatively mature industry), and medical equipment and supplies (not happening much; only 3 organizations nationwide with \$150 million in potential recovery value). Food residuals (perishable, prepared, and canned) is another area of growth; Second Harvest handles 500 to 600 million pounds of food per year and is the second largest charity after Salvation Army.
- C Opportunities for growth include auto parts, office furniture, industrial items (tools, valves, motors), and office equipment. Davies Office Refurbishment in Albany, New York, manages 500 storage trailers with 1 million pieces of inventory.
- C The most successful reuse programs are driven by charitable, fundraising, social, and community development goals. Examples include Materials for the Arts, Second Harvest, and Goodwill. In particular, Goodwill operates approximately 190 reuse centers in North America. In total, there are approximately 13,000 reuse centers nationally.
- C Reuse and remanufacturing help recycling market development by providing an economic value to multi-material, nonrecyclable items; supporting jobs, business expansion, and investment; and increasing waste diversion.
- C To get involved, connect with ReDO, learn about existing reuse organizations by searching ReDO's database, find out what materials they need, include reuse in solid waste program planning, and provide business assistance to reuse organizations.

Q: How do reuse organizations get started?

A: Many are driven by entrepreneurs. It is important to understand the customer base and the industry before getting involved. Reuse involves providing items to customers via retail versus recycling which collects and processes commodities.

Q: Are reuse programs financially sustainable?

A: There is no distinction between nonprofit and for-profit reuse organizations. In order to be sustainable, reuse organizations must control costs and have a well developed business plan. Paper exchanges, however, are typically grant funded and are often not sustainable. Generally speaking, if a warehouse is involved, a business plan is necessary. To track success, organizations can measure Web site hits versus materials actually exchanged.

Q: Do new organizations have trouble obtaining capital grant funding?

A: ReDO has found that organizations have a greater likelihood of obtaining funding from local charitable foundations than from government agencies.

Q: What are typical per ton costs for reuse?

A: Reusable items have a high material value. In many cases, there is a charge for handling materials versus a per item value. Handling materials on a retail basis differs sharply from handling industrial products and materials.

Julie Sullivan, Association for Resource Conservation

The speaker operates the Materials Resource Center and provides reusable items to teachers, schools, and other clients. The 2,500-square-foot center handles a whole range of materials including excess paper from printers, vacuum bag paper, dentist bibs, spools, cones, wires, and tissue paper. Some items, such as foil coated paper, have no recycling markets but make great supplies for school arts and crafts projects. The center also collects office equipment such as computers. When materials arrive at the site, they are weighed and inventoried before being offered for reuse.

The center was established with grant funding from EPA and other sources. To date, the center has received wide community support, primarily because of its benefits to local schools. Due to the success of the operation, the center may double in size by 2001; it could grow to 20,000 square-feet by 2005 and expand to collect other items such as building materials. The center had expenses of \$160,000 during its first year and earned \$20,000. It has 200 paid members who each pay \$0.25 to \$0.30 per pound of material delivered; teachers shop for free.

Q: How do you raise money to support your operations?

A: We recommend applying to foundations with an interest in startups rather than trying to get funding from environmental organizations. Emphasize that your project is sustainable and a model for the community.

Q: Are hazardous chemicals reusable?

A: There are a limited number of chemical donation and reuse programs. The programs vary according to different state laws.

FRIDAY, MARCH 31

Concurrent Commodity Workshops: Large Volume Materials Recovery

Construction and Demolition Debris/Building Deconstruction

Matt Ewadinger, NC RBAC

C&D debris comprises between 27 and 32 percent of the disposed waste stream. Only 3 percent is recycled. There are tremendous opportunities to recover this material and put it to productive use.

Michael Ohlsen, Florida Recycling Business Assistance Center

With JTR funding, the Florida Recycling Business Assistance Center conducted a deconstruction project to help address the large quantities of construction and demolition (C&D) debris disposed of in Florida each year. Deconstruction refers to the disassembly of structures for the purpose of reusing components and building materials.

Florida's population has grown dramatically in the last 50 years—from 2 million residents in 1950 to nearly 15 million residents today. As the state grows, more and more older structures are being demolished to make room for new buildings. According to EPA, approximately 136 million tons of building-related C&D was generated in 1996. The majority of these materials (92 percent) were generated through renovation and demolition; only a small percentage was generated from construction nationally.

There are a variety of issues related to disposing of C&D debris. Chromated copper arsenic (CCA) treated lumber can pose a health risk by resulting in concentrations of arsenic in landfills. Other materials can impact C&D landfill leachate, as well. In addition, when landfilled, gypsum drywall (calcium sulphate) transforms into hydrogen sulfide which creates odor problems and a health risk.

Demolition is one option for tearing down an old house. It takes less time than deconstruction and only requires 1 to 3 staff members. It is also attractive in Florida because the state has low landfill tipping fees for C&D waste compared to MSW. There are much more limited uses for the recovered material, however, because it is mixed together. Across the U.S., 300,000 buildings are demolished annually, with an average home contributing 13,000 board feet of lumber. Since the 1950s, more than 3 trillion board feet of lumber is sawn in the U.S.

In contrast, deconstruction is more labor- and time-intensive. It can require up to 10 times more people than demolition. The value of the recovered material is significantly higher, however, making deconstruction cost-effective. Deconstruction also provides the opportunity to link with job training programs. In Florida, deconstruction is most appropriate for pre-1940, wood-framed houses. At a typical deconstruction site, approximately 75 percent of the material is recovered and 25 percent is landfilled. In fact, recovery rates up to 80 percent are not uncommon.

Based on Florida's case studies, deconstruction is a cost-effective alternative to demolition. It costs an average of \$2.60 per square foot, which accounts for an average cost of \$6.10 per square foot and an average salvage fee of \$3.49 per square foot. This includes costs for planning, training, management, and disposal, assuming 25 percent is landfilled. By contrast, demolition costs an average of \$4.05 per square foot. Prices for resale were based on local markets. Potential audiences for deconstruction include housing

authorities, redevelopment organizations, job training/employment agencies, community development corporations, military base closures, and low-income housing developers.

When a house is abandoned in the City of Gainesville, the city requires a 90-day notice period to allow the house to be recovered. This provides an important advantage for deconstruction since it gives planners time to develop a plan for deconstruction.

One challenge is developing a standard grading system for the wood that is recovered. The Florida RBAC is working with the U.S. Forest Products Lab in this area. This is an important issue, because lenders need assurance that building structures will meet the relevant building codes.

Mr. Ohlsen then discussed the typical steps involved in the building deconstruction process:

- C Conduct an environmental assessment. This would involve looking for problem materials such as asbestos and lead.
- C Remove all fixtures, including windows, doors, cabinets, sinks, toilets, or bathtubs.
- C Remove the interior walls.
- C Remove the roof.
- C Focus on the exterior of the building.
- C Denail the wood.
- C Focus on the foundation.
- C Salvage the chimney, if feasible.

The Florida RBAC is involved in the following mentorship/partnership projects:

- C In Kinston, North Carolina, a pilot deconstruction effort has been undertaken to assist in the development of a deconstruction program to remove houses in flooded areas of the city.
- C In Austin, Texas, with the Habitat for Humanity Austin ReStore, a deconstruction project will involve potentially 60 buildings at the Fort Hood Army Base.
- C In St. Petersburg, Florida, a project with the St. Petersburg Housing Authority will assist in the demolition and construction of buildings in a housing project involving job training for local residents.
- C In Arkansas, a project with Fort Chaffee Army Base will analyze and remove over 600 World War II-era wood buildings through demolition and deconstruction.

The Florida RBAC is also developing a computer building deconstruction assessment tool to be available on the Internet. The tool is designed to allow users to identify deconstruction and market opportunities on a customized basis. After the term of the JTR grant ends, the Center for Construction & Environment at the University of Florida will coordinate deconstruction efforts in the state.

Q: Is there a large scale market for recovered porcelain fixtures (e.g., toilets, bathtubs)? What about other materials?

A: In Florida, information on deconstruction is being collected on a house-by-house, case-by-case basis. They may discover large scale markets as the program evolves, however. ReDO is developing a program to handle larger amounts of recovered material and distribute these materials to smaller reuse organizations around the country. Another major market opportunity is finding local construction projects occurring at the same time as deconstruction efforts. In California, some groups have established on site deconstruction efforts. Others have arranged for an “open house” event to allow individuals to remove pieces of the house; this reduces transportation and inventory costs.

A: Deconstruction materials often need to be removed and resold right away. One participant found it makes more sense to warehouse the items and resell them over time.

Q: What are the opportunities for job training with deconstruction?

A: The Institute for Local Self-Reliance has looked into the link with community labor and other social programs. Deconstruction provides the opportunity to see first-hand how a building is taken apart and put together which is important because the need for skilled labor in this area continues to grow. North Carolina is looking into deconstruction training programs.

A: Vermont has issued a request for proposals to deconstruct an old police station. The project will involve a community service opportunity for children through the state’s court diversion program.

Lou Sanzaro, Ocean County Remanufacturing Center

The Ocean County Remanufacturing Center is a 20-acre C&D recovery operation in New Jersey. With a staff of 7 people, the facility recycles 700 tons per hour of concrete, asphalt, and rubble debris to be used as a road base aggregate and 500 tons per week of recovered wood. In total, the company sold 300,000 tons of concrete and asphalt in 1999. There is a high demand for this material. Only 60 tons of material was landfilled in 1999, primarily because the center closely inspects and controls all materials that enter the site. Companies are charged \$4 per ton to deliver materials to the site versus \$74 per ton at the local landfill.

The Center produces high-quality, marketable products such as a high-end dyed mulch as well as playground surfaces that have been tested and approved. The site is also permitted to recycle tires using an innovative technology. The end product will be used as an impact additive in plastics products for the automotive industry and will be sold for \$600 per ton. The site also produces a high-quality top soil from stumps and trees delivered to the site. Companies need to do their homework to understand the value of recovered C&D materials. His company is working on a cost-effective technology to remove the activated carbon from recovered wood. Another technology is designed to remove wood through a rapid thermal pyrolysis system to generate oil for fuel; fluctuations in oil prices, however, are preventing this technology from moving forward.

He highlighted the need for more interaction between government and private industry. Government cannot be expected to be aware of every new technology; as a result, however, regulations are enacted that inhibit recycling efforts. Deconstruction is not allowed in New Jersey which results in the disposal of significant quantities of material.

Q: The Massachusetts DEP is working to provide incentives for contractors to source separate C&D debris on site. Are other states working in this area?

A: Source separation is more costly and time consuming for contractors. The key is providing contractors with the training and technology needed to source separate as efficiently as possible.

Q: What percentage of material comes to your facility from the residential versus commercial and industrial sectors?

A: It varies, although roughly 30 percent comes from waste haulers and 70 percent from private contractors.

Q: Do contractors source separate wood material at construction sites?

A: Yes, especially at the larger construction projects. This typically results in large quantities of wooden pallets and crating.

Q: Can you use recovered plastic in asphalt?

A: It is not economical to do so because it is not a high-value market; putting the material into new plastic products commands a much higher value. In addition, it is not widely accepted by state highway transportation departments.

Q: What is the status of recycling used asphalt shingles?

A: Prior to 1973, asphalt shingles contained asbestos. As a result, it is cost-prohibitive for companies to test every load for asbestos as they are required to do by law. There is debate, however, over the health risks associated with the shingles since the asbestos is encapsulated in the product and asbestos is only a problem when it is airborne. Used asphalt shingles can go into a hot asphalt mix without any problems, however.

A: In Delaware, the state is reconstructing I-95 and is using a “rubbleizer” machine to incorporate used asphalt on site into the mix.

Q: In Florida, have you run into any problems with insect infestations?

A: When we evaluate a house, we look for deteriorated wood bores due to insects, mildew, and other problems. The computer assessment tool allows users to assess the general deterioration of a building.

Q: Have other states tried providing model specifications for deconstruction to contractors?

A: There is a need to develop grading specifications for recovered wood. Regarding specifying a project for deconstruction, the major barrier is time and how the property will be used. Gainesville, Florida, provides a 90 grace period before demolition can begin but this is not common.

A: The North Carolina RBAC is looking into mobile home deconstruction. Thus far, two companies have been awarded loans through the state’s revolving loan fund to work in this area.

Q: Have you considered developing tax incentives for deconstruction?

A: Not yet. In Florida, our approach is to first prove the concept, then focus on policy options to promote deconstruction. In San Jose, California, contractors pay an advanced disposal fee based on materials used in a construction project. High tipping fees also provide an increased incentive for deconstruction.

A: One participant suggested educating contractors about reuse opportunities as part of the building permit process.

Q: Are there any operations that collect unsorted C&D waste for recycling?

A: A facility in Wilmington, Massachusetts, collects unsorted C&D debris and screens out wood to create a high-quality mulch. A high percentage of the material is also used for daily cover at the landfill.

Industrial By-Products

Randal Coburn, Empire State Development

A growing interest in industrial waste has developed as a result of the synergy between public policy and private industry objectives. It provides an opportunity to put the principles of industrial ecology in action and spurs competition with disposal. There is a tremendous amount of material being generated and a growing demand for industrial byproducts as feedstock.

New York works with the Center for Integrated Waste Management and provides financial support to projects involving industrial wastes. The state also offers hands-on technical assistance. Strategies include partnering with the New York Department of Environmental Conservation to learn about relevant regulations. New York focuses on projects close to commercialization with committed and knowledgeable staff. More specifically, New York has worked to find markets for papermill residuals, metal grinding sources, cheese whey, coal fly ash and plastics to create a lumber product, foundry sand, and food waste.

Mike Lenahan, FIRST Project

The speaker discussed recycling within the foundry industry. While only 20 percent of household waste is recycled, roughly 95 percent of all foundry waste is recycled. The foundry sand is used to make products such as concrete barriers. The speaker then discussed ways to improve regulations to provide an incentive for recycling. In particular, it is important to involve industry from the beginning and form a joint working relationship. Government agencies should put the burden on industry to meet environmental goals outside of a regulatory framework. Government agencies can also support industry by funding demonstration projects. For more information on FIRST, visit <www.foundryrecycling.org>.

Q: What has been your experience with hazardous waste associated with foundry sand?

A: There are some leaded alloys in the silica from iron and aluminum foundries.

Q: Are there any examples of how you worked together with other groups?

A: Our facility generates some scrap material commingled with other materials such as paper. FIRST partnered with a ready mix user and saved approximately \$650,000.

Dale Thompson, Minnesota Pollution Control Agency

Minnesota has a broad definition of industrial waste and a team working on procedures for its beneficial reuse. The state's objective is to minimize exposure to substances that are harmful to human health and the environment. Some states have specific laws or rules developed for beneficial use determinations (BUDs) for reuse of industrial byproducts, materials, and wastes. In addition, some states have policies or guidance they use to assist in decisionmaking with regard to beneficial reuse. Reuse of industrial byproducts can increase

exposure or release of harmful substances to the environment. The public puts its trust in government agencies to protect them while encouraging reuse and waste reduction.

The state evaluates different risks to human health and the environment. Air pathways for exposure include evaporation, redeposition in rainfall, and inhalation of vapors, particles, or dust with contaminants attached. Land pathways include plant uptake and direct contact with contaminants in soil, food ingestion, and direct contact with food and people's hands. Water can be released to surface water through runoff or dissolved contaminants or erosion of soil with adsorbed contaminants attached. Ground water is impacted by leaching from a product or facility into soil water from land applications.

Q: What is your role on the ASTSWMO Task Force?

A: I am the Chair of the Beneficial Use Task Force. We are trying to identify the status of different state efforts and encourage information sharing and relationship building.

Q: Will there be a list server for the ASTSWMO Task Force?

A: Possibly, but our next step will be to use the ASTSWMO Web page to provide information.

Q: What are examples of ways New York has developed business entrepreneurial ideas? What methodologies do you use to identify waste streams and criteria for evaluating the viability of businesses?

A: With paper mill residuals, there was an opportunity and entrepreneurs responded. The state's role was to help show that residuals were viable and to match companies and entrepreneurs with researchers at universities. In the future, we might conduct an assessment upfront to help target our resources. Louisiana has a database of the regulated industrial wastes to help provide information to interested parties.

Q: Is there a way to avoid doing a case-by-case analysis of BUDs for residuals?

A: Every state is different. Wisconsin developed a database which helped define the state's program.

Q: What is the best way to share resources on industrial waste reuse?

A: Perhaps ASTSWMO can help facilitate this effort. Or maybe there is a role for JTR through JTRnet. Trade associations may also play a role. EPA should invest in this type of effort rather than each state individually.

Q: Is there a way to identify how much waste is produced from different industrial waste streams?

A: Visit DOE's Industries for the Future Web site located at <www.oit.doe.gov>. In addition, EPA has developed software for this purpose. There is also a Sustainable Industries Web site. California, Illinois, Massachusetts, New York, Pennsylvania, and New Jersey have developed draft protocols to develop consistent standards for BUDs.

Concurrent Commodity Workshops: New Trends

Plastic Bottle Design-for-Recycling

Ed Boisson, Plastic Redesign Project

Mr. Boisson introduced the session by highlighting a variety of issues related to PET bottle recycling. He began by noting there is an established PET bottle collection and processing infrastructure in place. Today, over 8,000 community curbside programs collect PET bottles. In 1998, 588 million pounds of PET bottles were recycled, an increase of 350 percent since 1988. There are 24 processors in the U.S. with over 1 billion pounds of capacity.

In recent years, however, PET collection has stagnated while PET production has exploded as it gains market share at the expense of aluminum, glass, steel, and paper. In fact, PET production has grown by 18 to 24 percent annually.

Currently, the plastics recycling industry is grappling with new PET beer bottles being introduced into the marketplace. Miller has launched plastic beer bottles in certain markets and Anheuser Busch is expected to launch its product soon. Among the beer manufacturers, several different plastic containers are under development, each with 3 to 5 different plastic layers.

Steve Navedo, Puretech Plastics

Mr. Navedo spoke on behalf of plastic reclaimers to address the challenges associated with the new PET beer bottles. Plastic reclaimers purchase baled and shredded PET bottles, process the materials to produce clean flake or pellet, and sell the finished product to manufacturers for products such as recycled content carpeting and bottles. Mr. Navedo is an active member of the Association of Post-Consumer Plastic Recyclers (APR), an organization that represents over 90 percent of all postconsumer plastics recycling in the United States. APR is concerned about what is happening in the plastic recycling industry and is working to find win-win solutions for everyone involved.

He began by discussing the following trends in the marketplace:

- C Reduced supply. Manufacturers cannot get enough recovered PET for their operations. APR is looking into how to increase collection of recovered PET, such as increased deposit legislation. APR is hoping to work with industry and government to find a solution to increase collection rates.
- C The feedstream is becoming more complex. PET is the material of choice for the packaging industry, yet different containers use different plastic compositions.
- C There is a danger of becoming overwhelmed. There are many more companies making bottles than recycling them. This makes it difficult for reclaimers to manage the many different types of bottles being produced. In addition, the additional processing costs associated with handling different plastic streams sharply reduces the revenues from plastics recycling.
- C Increase in PET beer bottles. Beer companies are targeting arenas, stadiums, and beaches with plastic beer containers.

- C Gradual cooperation from industry. APR is working with the beer industry on a product-by-product basis to test new plastic bottle designs for recycling. There are major uncertainties about handling the “recycling stew,” however, when all of the different bottles with different barriers and coatings end up commingled at the recycling facility.

The trend towards plastic beer bottles is largely consumer- and marketing-driven although it does offer transportation cost savings and less container breakage in sporting arenas. Sorting the new plastic beer bottles presents a major challenge. The technology is set up to separate clear plastic from green plastic. There is no technology to separate clear beer bottles from clear soda bottles. The two different types of clear plastic cannot be mixed because of the intrinsic viscosity of the plastic. Plus, there is no established market for amber plastic. The metal top and metal label also create problems because they introduce a major contaminant into the stream. On the other hand, polypropylene caps are not a problem; Puretech recycles over 250,000 pounds of polypropylene annually.

When Miller initially introduced its plastic beer bottles in a test market in Los Angeles, there were a number of problems. As a result, Miller and the other manufacturers have devoted significant efforts to research and development.

A: One approach is to look at how Europe has dealt with the issue since they have been using plastic beer bottles for several years.

A: The Plastic Redesign Project is looking at the economic impact of the bottles on local collection programs. Plastic reclaimers may, for example, reduce the prices they pay communities because the value of the recovered materials is lower. At this point, however, this is not a major issue because of the shortage in general for recovered PET bottles. California expanded its bottle bill on December 1, 2000; yet, during the first few months, 97 percent of the recovered material was sent to Asia and not marketed domestically. There will not be any new virgin resin capacity coming on line for several years. Thus, pricing for PET will remain strong.

Robin Cotchan, Director, Association of Post-Consumer Plastic Recyclers

Established in 1992, APR is the national trade association representing companies that acquire, reprocess, and sell the output of more than 90 percent of the postconsumer plastic processing capacity in North America. APR strives to eliminate barriers in plastic recycling with technical programs and guidelines. These initiatives have been produced in response to a need to provide information to the plastic packaging industry on what elements of package design may or may not affect the recycling of that package in current systems.

Working together, APR has developed guidelines for plastic bottle recycling in order to promote the most efficient use of our nation’s plastic recycling infrastructure. The guidelines recommend preferred designs and variants (e.g., closures/liners, colors, label/adhesives, decorations, multi-layers/coatings). APR also offers a cooperative testing program for bottle designers and converters called Champions for Change. The program is intended to promote technology transfer and allow manufacturers to keep pace with new types of packaging. As an example, Continental PET Technologies conducted extensive testing of its new plastic beer bottle for Miller. Other companies are also participating in the program, both industry leaders and small microbreweries. APR is also testing labels and adhesives on plastic bottles.

The organization offers awards to recognize innovative designs, cooperative testing activities, and creative uses of postconsumer plastic recycling. In summary, APR's role is to provide cooperative testing, educate the consumer product industry, inform reclaimers, and work together to address challenges and protect the current plastics recycling infrastructure. To learn more about APR, visit <www.plasticsrecycling.org>.

Q: What is the current status of plastic detection technology?

A: The plastics industry currently sorts whole bottles and flakes. The problem is there is no capital available to purchase new processing equipment to handle the increasingly complex loads of mixed plastic. One potential solution is to ask the beer manufacturers to help purchase the new detection equipment.

A: Developing a consistent SPI coding system for the new plastic beer bottles is another issue. States need to coordinate on whether the bottles should be coded #1 or #7 plastic. To date, at least four states have been approached by beer manufacturers on this issue.

Ed Boisson, Plastic Redesign Project

The Plastic Redesign Project is a coalition of state and local government agencies with the goal of keeping up-to-date on plastic recycling issues and promoting win/win solutions. The project encourages voluntary commitments from industry to promote plastics recycling. Recently, the project has focused on the wave of new plastic bottle designs, initially with HDPE pigmentation and now with beer bottles.

The project aims to strengthen recycling economics, limit new costs, pursue voluntary solutions only, and represent members interests but work cooperatively with all stakeholders throughout the recycling system. Its approach is to research design trends and impacts and recycling markets with the goal of providing information through the Internet, presentations, articles, and reports. The project has produced reports on plastic design guidelines, an analysis of HDPE pigmentation impacts, and an analysis of PET beer technologies. The project coordinates with APR and other groups to track PET collection and recycled-content in bottles.

The Green Building Movement

Ken Sandler, U.S. Housing and Urban Development (HUD) PATH Program

Over the past two decades, the supply of recyclables has boomed; to keep markets stable and profitable, demand needs to keep pace. With this in mind, construction materials are a promising target for market development. Construction equals 60 percent of the total material requirements in the United States (excluding food and fuel). "Green building" can be defined as using environmentally preferable materials in construction projects with multi-media benefits (e.g., recycled content, energy efficiency, water efficiency). Green building is a growing trend that involves federal, state, and local programs as well as industry efforts.

The HUD PATH Program is a Presidential, multi-agency initiative. The goal of the program is to reduce the environmental impacts of housing by 50 percent by 2010. The program will develop an inventory of 160 technologies developed to date, including 70 for energy efficiency. The program also will support 20 pilot and demonstration projects including large housing developments. For more information, visit <www.pathnet.org>.

Barriers to market acceptance of green products include the lack of standards defining “green.” There are a variety of programs including the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) program, DOC/NIST’s Building for Environment and Economic Sustainability (BEES) software, ASTM plastic lumber standards, and building products lifecycle cost tools. Local green building programs provide access to information, as well.

Uniting the building community and the recycling industry is another challenge. Green building can gain valuable lessons from the experience of the recycling industry. To learn more about green building, visit Web sites such as <www.greenbuilder.com>, get involved with the U.S. Green Building Council, and work with recycling building product manufacturers.

Nadav Malin, Environmental Building News

Published since 1992, *Environmental Building News* is a widely read publication focusing on building materials. Each year, its publishers produce a CD-ROM containing all of the issues for the year. Its publishers have also developed a software tool called the “Green Building Advisor.” The tool contains 5 main topics on green building including site and ecosystems, energy, water, recycled materials, and indoor environment. The tool uses lifecycle cost analysis to consider a range of environmental criteria.

The speaker then listed a number of examples of green materials and green houses/structures. He also discussed *GreenSpec*, a directory of green building materials produced by *Environmental Building News*. For a more complete review of *GreenSpec*, read an article entitled, *Building Materials: What Makes a Product Green?*, in the January 2000 issue of *Environmental Building News*. *GreenSpec* includes products made from environmentally attractive materials (e.g., postconsumer content), products that are green because of what they do not contain (e.g., avoid hazardous components), products that reduce impacts during construction and operation, and products that contribute to healthy indoor spaces. He also discussed *Green Building Materials*, a new book by Ross Spiegel and Drew Meadows which contains green specifications.

Q: How do you factor transportation impacts versus other impacts into a lifecycle cost analysis?

A: There is no clear answer. There is a tradeoff between constructing a new building (even green) when an existing building may be repairable. Economic incentives often focus on short-term construction costs and ignore long-term operational costs.

A: Third-party labeling federal government efforts are not coordinated; there are some single attribute certification systems and others that take a lifecycle approach.

A: Builders and architects need information about sources of green building products. There is also a need to educate a range of people related to the operation of green buildings, including janitorial staff and tenants in commercial buildings.

A: The state of Massachusetts is beginning to require green building specifications in state buildings.

A: There are a number of good publications on green building available from Pennsylvania and New York City.

Closing Session:

Putting It All Together, New York City as a Market Development Case Study

Allen Zerkin of New York University facilitated a session on New York City's efforts to manage its solid waste after the Fresh Kills landfill closes in December 31, 2001. Particular emphasis was placed on the role recycling market development can play in solving this problem. As background, the following information was presented regarding solid waste management in New York City:

- C The New York City Department of Sanitation is responsible for collecting the approximately 13,000 tons of residential and institutional waste generated each day. Private waste haulers collect the city's commercial waste. When Fresh Kills closes, waste export is expected to cost \$500 to \$600 million per year.
- C The following organizations are involved in this issue: New York City Economic Development Corporation, New York City Department of Sanitation, Empire State Development, and Con-Edison. EDC is the lead economic development agency in the city. In general, the city has pronounced they want to take a hands-off approach on this issue and allow the free market to dictate any market development activities. Empire State Development is the most active government agency on this issue. Its Environmental Investment Program offers funding for capital equipment, research and development, and technical assistance to promote recycling market development. Con-Edison is involved because the recycling industry is energy intensive and may require negotiation of energy deals.
- C There are a variety of active recycling projects around the city targeting paper, wood, sawdust, tires, glass, electronics, food waste, C&D material, and rendering. The export market is strong for scrap metal, paper, OCC, plastics, and carpet. Reuse efforts such as WasteMatch, Materials for the Arts, pallet remanufacturing, and auto parts remanufacturing are also ongoing.
- C There are also a variety of market development studies underway focusing on wood scrap from manufacturing firms; the Bronx Recycling Industrial Park; the Long Island City Eco-Industrial Park, and a Jamaica remanufacturing business.
- C Other initiatives include the Center for Remanufacturing and Technology Transfer at York College and the Port Ivory Recycling and Transfer Alliance which is working to locate a recycling transfer site in close proximity to a recycling industrial park.
- C Challenges include the landfill closure deadline which is driving the planning emphasis on alternative disposal capacity, environmental justice concerns, and the high cost of doing business in New York City.
- C There are tremendous opportunities, as well. These include the once-in-a-generation opportunity to effect change, the improving economics of recycling, the groundswell of community interest to do better, and the changing political landscape.

The Roundtable discussion included the following participants: Alan Zerkin, New York University; Robert Lang, NYC EDC; Robert Balder, NYC Department of Sanitation; Kay Hayashi; Randal Coburn, Empire State Development; Thomas Outerbridge, CityGreen, Inc.; Resa Dimino, Sustainable Enterprises; and John Manak, Con-Edison.

Q: It is difficult for recycling businesses to be competitive in the New York City market. What can government agencies do to help? Provide low-cost land, energy subsidies, material reuse rebates?

A: The NYC EDC negotiates land sales and leases for all businesses in the city. One of the most difficult challenges will be to find an appropriate site for a recycling business in the city. Land is a very scarce commodity. Recycling businesses face the “Not in My Backyard” (NIMBY) syndrome. Other issues include proximity to wetlands, lack of public transportation, and the cost of labor and insurance. It took close to 4 years and significant capital to find a site for the Visy paper mill. Smaller companies may not be able to afford to work within this time frame. EDC is available to help companies find properties. The city has an aggressive real estate tax abatement program.

Q: Are brownfield sites an option?

A: Typically older manufacturing sites, brownfield sites are a possibility; however, it is important to spend additional time upfront to make sure companies know what they’re getting into with these sites. There may be contamination and other issues to contend with.

A: At Con-Edison, we view the utility as a catalyst for market development. We worked closely with Visy to develop an attractive energy package, giving the company 25 percent off their energy costs for a 15 year period. By offering savings to the customer, we hope to encourage recycling companies to move to the area.

Q: What about siting facilities at industrial parks?

A: This is a good idea but there are some issues involved. It can be difficult for companies to co-exist in crowded areas. There is also a perception by existing tenants that recycling companies will be a nuisance, bringing additional traffic, noise, and pollution to the site. Recycling businesses can only be sited in those areas zones for industrial purposes.

Q: How have NIMBY problems have been addressed in other situations?

A: In Middleton, New York, we successfully sited a waste-to-energy facility. We held over 200 public meetings and involved the local environmental organizations early in the process. If you want to get buy-in from the community, you need to involve them upfront in the review and siting process. In Louisiana, developers are avoiding this issue by moving industry to rural areas. This has created problems as more and more citizens move to the rural areas, as well. Developers need to think at least 10 years ahead.

Q: To what extent has a front-end approach been taken with other New York City-based efforts?

A: With the Bronx paper project, the Natural Resource Defense Council (NRDC) spent years on outreach in an effort to build long-term relationships. NRDC found that people support recycling-based manufacturing and understand it, but have concerns about truck traffic and air emissions. Major barriers included the cost of labor and construction in the city. EDC does not do enough outreach until a project is concrete. Plus, outreach can be difficult because not everything can be disclosed which leads to mistrust by the general public. The Port Ivory project is also doing a lot of outreach to generate support.

Q: What are some examples of successful siting strategies?

A: Giving communities access to information is key. One approach is using a Geographic Information System (GIS) to graphically depict potential industrial sites and present different options to the public. Other policy options include purchasing recycled-content products, setting minimum content standards, increasing tipping fees, and establishing a fee to fund market development.

A: Another major policy issue is that the city is preparing to spend between \$500 to \$600 million to export its garbage. The city shouldn't look at the potential cost of export as money to invest in recycling businesses but as a fee for service. Thus, the funds could go towards recycling as a fee for service, not as a subsidy.

A: For recycling to happen, the burden should not be placed on any one community. Each community should be responsible for its own waste to create a more self-sustainable system. This approach presents major challenges for communities like Manhattan that simply cannot make this commitment.

Q: What commodities should we focus on?

A: A first step would be to conduct a waste composition study for the commercial and residential waste stream. These studies are costly, however, and some participants questioned whether it was a worthwhile exercise since a study was done in 1990. In New York City, private haulers are required to provide a waste audit upon request by a business. This is not happening, however. Another participant noted that waste stream data will not lead to a solution but may provide a foundation for discussion. Another participant suggested targeting food waste, but noted there are challenges with collecting it.

Q: What information is needed before putting together a deal?

A: Con-Edison made a major effort to put an incentive package together with Visy. Con-Edison works on a case-by-case basis to develop an appropriate deal. From the Department of Sanitation's perspective, recycling businesses are risky. Most are run by entrepreneurs who have trouble getting started. The question is how much money can you afford to invest in them and how long can you subsidize them?

A: The city council is looking very seriously at waste prevention proposals, but would need to see something firm. The city has created a fund for emerging industries (mostly technology-based), but may expand the scope of its definition. This \$25 million venture capital fund is for startup working capital between \$250,000 and \$750,000. It may include recycling companies to the extent that they have new, innovative technologies in their operation. The discover fund is another venture capital fund that lends between \$1 and \$9 million.

A: Financing recycling businesses is difficult because the system favors disposal. We are trying to change the system.

Q: For which commodities are there markets in New York City?

A: Participants mentioned plastic, construction materials, paper, and composting. Manhattan, in particular, offers enormous potential for composting with its large number of restaurants. In addition, only 45 percent of the city's paper is collected by Visy. The rest is sent to paper processors outside the city. There is also potential to convert MSW to ethanol for use in fleet vehicles. A privately-financed, 16-acre facility in Middletown, New York, accepts 800 tons of MSW per day and generates methanol.

The group concluded by deciding to hold a follow up event after the November election to build an agenda for recycling market development in the city.

**Attachment A:
Key Findings from State RMD Interviews**

State Program Strengths

- C Majority of states: incrementally increasing capacity for reusing secondary materials through assistance to small businesses (startups, networking, facilitation).
- C Individual states: technical assistance, R&D, integration with state economic development, promotion of recycled product manufacturers, support of local RMD.

State Program Challenges

- C Lack of resources: many states indicate recently reduced support for RMD.
- C Developing markets for non-traditional secondary materials.
- C Promoting new product development.
- C Promoting buy recycled.

State Program Weaknesses

- C Ability to bring about major expansion in capacity to reuse secondary materials (and to work with large companies).
- C Stimulating feedstock conversion.
- C Promoting new product development.
- C Having an impact on prices/impacting the market.

Barriers to Greater Recycling Market Development

The following reflects the breadth of answers offered by states. No one item predominated:

- C Within state government: lack of resources, lack of financial incentives to offer businesses, lack of relationships with development agencies, lack of mandates or legislation, other environmental and economic development priorities, poor management.
- C Market environment: low population density, low tipping fees, low cost of virgin materials, manufacturers' resistance to change, unreliable quality of secondary feedstock, strong economy, lack of business access to capital.

- C Information: technical information on materials reuse, best practices and programs in RMD, difficulties tracking and measuring program impacts, understanding how economic developers think, up-to-date data and information on specific commodities markets.

Role of JTR to Date

- C Most JTR grants have had a positive impact.
- C Two-thirds of states continued to fund activities after JTR grant expired.
- C Nearly all states find the list server and the roundtable of value.
- C Not many states make use of the JTR Web site.

Suggested Roles for JTR Network

- C Promote peer-to-peer interaction.
 - Continue JTR list server
 - Continue JTR National Roundtable
 - Facilitate more regional interaction and cooperation (e.g., regional roundtables, regular regional conference calls on select topics)
 - Host moderated on-line discussions, with guest experts, and with transcripts stored on Web site (like NRC electronics recycling)
 - Facilitate peer special interest groups (e.g., product development, buy recycled)
 - Foster mentoring program among the states

Offer Structured Learning Opportunities

- C Facilitate training in RMD practices and in basics of economic development.
- C Facilitate more regional interaction and cooperation (e.g., regional roundtables).

Provide Information Resources

- C Technical: serve as technical information clearinghouse on secondary materials reuse.
- C Resources: reliably provide up-to-date information on federal resources available outside JTR, including notice of RFPs in a timely manner.
- C Programs: identify best practices in RMD, including programs, laws, and regulations; building relationships with development agencies. In particular, identify means for dealing with non-traditional MSW (e.g., C&D, industrial solid wastes).
- C Legislation: track federal and state legislation regarding RMD.

- C Markets: provide commodity-specific news, trends, and projections on Web site.
- C Economics: provide information that makes case for recycling and RMD (e.g., true costs of landfilling, life cycle costs).
- C Stimulate greater use of JTR Web site.

Build Case for Recycling Market Development

- C Provide information.
- C Support and promote federal and nationwide buy recycled efforts.
- C Build awareness of market development benefits, and JTR, among federal development-related agencies.

Support Recycling Markets Policy Development (Federal and State)

- C Set common vision, priorities for action.
- C Participate in discussions regarding national materials policy.
- C Identify state RMD legislation models and options.
- C Track federal and state legislation regarding RMD.

Attachment B: Small Group Discussions

Group #1: Existing Business Assistance

Participants: Matt Ewadinger, Jim Gilbert, Marshall Budin, Pat Langan, Abraham Weaver, Joyce Mason, Eve Martinez, Ted Campbell, Bill Buckner, Resa Dimino, Chris Benjamin.

Current Activities

- C Nebraska is working on an inventory of plastic manufacturers and is trying to recover more postindustrial waste. The state also incorporated a number of recycling-related questions into Nebraska's annual economic development survey of businesses.
- C North Carolina is working with SBDCs to develop training courses around the country for businesses on the principles of business development and recycling.
- C Delaware is focusing on C&D materials and finding appropriately zoned tracks of land for recycling businesses. The state is also interested in linking with high tech industries.
- C New Jersey is working with companies to phase out the use of mercury in products.
- C Massachusetts operates a program that provides up to \$50,000 in grants per company. The grants require a 3-to-1 match and a commitment by the companies to increase recycling. Each year, the state targets different commodities based on policy initiatives (electronics, mercury reduction) and waste characterizations. The state also manages a loan fund administered by a private sector company. The state is having difficulty finding enough applicants. Massachusetts is also partnering with groups like WasteCap to do peer-to-peer matching. There are also WasteCap programs in Wisconsin and New Hampshire.
- C York College is reaching out to companies trying to remanufacture products such as furniture, computers, and automotive parts.
- C Full Circle is a fluorescent lamp and computer recycling company in the Bronx. Recent changes in the fluorescent lamp regulations have made it easier to recycle them. Roughly 90 percent of the 600 million lamps generated each year are disposed of. Increased education is needed.
- C Sustainable Enterprises is doing a feasibility study on a recycling industrial park and is working with INFORM on a waste prevention campaign in New York City.
- C California has a Recycling Market Development Zone program that offers up to \$2 million in loans at a rate of 5.3 percent. Through a JTR grant, California is working to create an industrial recycling park in the San Francisco Bay area.
- C South Carolina has a company visitation program to provide one-on-one assistance and increase the visibility of the state's program. They are working to identify opportunities within existing economic development programs to promote recycling market development.

- C New York is trying to facilitate networking among recycling businesses and coordinate with groups that work with businesses nationally.

Barriers

- C New York is interested in learning more about the barriers to using ground rubber in soil operations.
- C Lack of support for recycling from the city. Environmental issues not given enough priority.
- C Massachusetts' grants require businesses to report a variety of information, which has proven a challenge for businesses. Similarly, York College has run into proprietary information issues with companies. Companies want grant funding, but don't want to be held accountable.
- C Lack of funding.
- C Lack of information on recycled product manufacturing.
- C Lack of technical assistance.

Group #2: Business Attraction

Participants: William Freytes-Arenas, Gray Russell, Marie Turley, David Cretors, Mitra Khazai, Sarah Carney, Daniel Jones, Michelle Staudinger, James Robb.

Current Activities

- C Puerto Rico is working to attract recycling businesses through a variety of incentives including loan guarantees, economic assistance programs, tax credits of investors, and a \$5 million loan fund. Puerto Rico also offers grants to nonprofits for recycling education. Recycling costs are a major challenge because of the need to ship materials from the islands.
- C Arizona takes a cluster economic development approach, targeting industries such as environmental technology, software development, and bio-industry. Site selection efforts are outsourced to consultants and commercial real estate firms. Arizona provides data to companies on the available supply of raw materials, including sources and quality.
- C Iowa's recycling market development program is housed in the state's economic development office. The state's market development efforts are coordinated with other states in the region: Indiana, Nebraska, Arizona, Illinois, and New Hampshire.
- C Indiana offers a loan program with \$500 million for the purchase of recycling equipment. The state is working to attract companies interested in expanding to the midwest. They are starting a marketing campaign outside of Indiana.

Barriers

- C Inter-state competition. Iowa, Minnesota, and Wisconsin are working together with the carpet industry to take back products, as well as the rest of the recycling infrastructure. Each state is competing with each other for recycling businesses.
- C New Hampshire has a low-density population and fewer recyclables, which makes it difficult to attract businesses.
- C Lack of funding and difficulty funding the right businesses.

Group #3: Feedstock Conversion

Participants: Charlie Jordan, Bud McGrath, Donna Stusek, Les Gould, Dale Thompson, Jill Krevlin, Amy Perlmutter, Stephanie Busch, Pat Imperato, Paul Ruesch.

Current Activities

- C The Chelsea Center for Recycling and Economic Development is working on a plastics feedstock conversion project with the Massachusetts Department of Environmental Protection. The center will also be issuing another RFP for \$5,000 to attract service providers.
- C Colorado worked with the Clean Washington Center on glass and plastic feedstock conversion projects that ultimately proved too costly. Case studies of companies that have done feedstock conversion successfully are needed.
- C Illinois has worked on CD cases made from RPET, shampoo bottles, and traffic control barricades.
- C Georgia has worked on feedstock exchanges of postindustrial materials between companies. An important step was getting community support for the project. The state has worked with a sawdust mill, power generation plant, mining companies, and chemical plants. The state has picked zip codes to identify proximity to existing P2 service provider relationships.
- C Massachusetts provides grants for community economic development to explore waste generated, feedstock demand, and facilitate exchanges.

Barriers

- C Grant evaluators are not capable of looking into commercialization potential.
- C Lack of funding and information.
- C Contracts with the state are cumbersome.
- C Some states are grappling with intellectual property rights issues.
- C Finding quality projects.

- C Knowing what to take credit for regarding business successes. Evaluation criteria are needed.

Opportunities

- C Providing information about RMD-related projects at universities.
- C Compiling a directory of services for the recycling industry.
- C Sharing U.S. Department of Transportation accepted uses for recovered materials.
- C Developing case studies on successes and failures.
- C Focusing on companies (e.g., auto manufacturers) that need to respond to a demand for recycled-content.
- C Working with the regulatory community up front.
- C Conducting an inventory of companies by SIC code to identify feedstock conversion opportunities.
- C Leveraging partnerships with MEPS and P2 programs. Make a checklist of opportunities to look for during audits.

Group #4: New Product Development

Participants: Wayne Gierde, George McDonald, Peter Cohen, Curtis Seyfried, Phil Vos.

Current Activities

- C Minnesota is working on a mixed plastic material (50 percent plastic and paper) to replace plywood for use in truck bed liners and other applications.
- C New products include recycled plastic lumber to replace wood and reusable ticker tape.
- C Honeywell has a 96 step process from product inception to market.
- C The group discussed the value of materials exchanges and changing perceptions towards recycled content products.

Barriers

- C Political will and regulation.

Opportunities

- C Promoting existing recycling and reuse businesses.
- C Providing education on the benefits of reuse and recycling.
- C Incorporating all seen and unseen costs.

Group #5: Product Stewardship

Participants: Jana White, Patty Dillon, Janet Matthews, Terry Grogan, Ed Boisson, Joe Carpenter, Chris Cloutier, Neil Seldman, Shawn Fischer, Todd Smiley, Cynthia Greene, Carolyn Grodinsky.

Current Activities

- C EPA is working on the following commodities as part of its EPR program: transport packaging, electronics, carpet, tires, and plastic bottles.
- C The Health Building Network consists of 200 organizations looking at EPP with a focus on hospital health.
- C *Take it Back!* is an annual conference focusing on building materials. It tends to review activities in other countries such as Brazil and El Salvador.
- C Massachusetts' CRT ban is supported by industry because it takes responsibility off of them. Should the business network be responsible for collection?

Barriers

- C Collecting the product. It is often assumed that municipalities and states will collect carpeting, for example.
- C Environmental organizations are no longer interested in waste issues.

Opportunities

- C Writing a report to Congress to describe EPR.
- C Identifying how to work with producers and not burden local communities.
- C Developing a "hammer" and using initiatives developed by Europeans (e.g., Norwegian standard for computer manufacturers) for product design.
- C Organizing a grassroots campaign to push federal and state governments into action. Continue to plant the seed for EPR at the grassroots and industry level.
- C Providing information on the JTR Web site.

- C Facilitating discussions with states that are trying disparate approaches to EPR.
- C Using the health issue to push grassroots national policy to protect children's health.
- C Focusing on the top 10 industries in different sectors because they manufacture 60 to 80 percent of all products. Target the waste stream based on predetermined criteria and then reach out to the top 10 industries.
- C Passing policy resolutions at the municipal government level.

Group # 6: Buy Recycled Promotion

Participants: Whitney Trulove-Cranor, Jeff Bednar, Robin Ennis, Amy Jewel, Michael Ohlsen, Thomas Outerbridge, Lynn Rubenstein.

Current Activities

- C NERC has a list server on EPP issues.
- C Pennsylvania offers business-to-business outreach on recycling and buying recycled.
- C Massachusetts has a procurement system that allows buyers to go with a higher bid.

Barriers

- C Perception of lower quality.
- C Home Depot is afraid to introduce competition to wood industry products.
- C Proof of performance.
- C Purchasers want certification that products meet the same performance standards as virgin products.
- C Government agencies are limited in their ability to endorse specific products.
- C State laws often discourage buying recycled. Even though some states require the purchase of recycled products, they often do not practice what they preach.
- C There is concern that some manufacturers are taking recycled content labeling off of packaging because of fear of public perception.
- C Education tends to focus on purchasing officials, but should be more broad-based. On a related note, decentralized, credit card purchasing makes it more difficult to promote buying recycled.
- C Purchasers make decisions based on price and performance.
- C True costs of virgin products are not reflected in their price (life cycle costing).

Opportunities

- C Developing a Web-based database of recycled products.
- C Putting specifications into RFPs for recycling.
- C Promoting awareness of regulations requiring buying recycled.
- C Approaching national office supply chains about educating their customers on availability of recycled products.
- C Providing incentives for businesses to buy recycled.
- C Providing greater appeal for the Comprehensive Procurement Guidelines for purchasing officials.
- C Holding buy recycled training for purchasing agents.
- C Conducting a national campaign started at the federal level (similar to the anti-litter campaign) rather than each locality putting resources into local campaigns.

Group #7: Buy Recycled Promotion

Participants: Elizabeth Olenbush, Carey Jeffries, Woody Raine, Ron Heckler, John Rogers, Tom Davis.

Current Activities

- C Buy recycled mandates at the state level in Indiana and Texas.
- C Price preferences in Texas, Ohio, Louisiana, and Indiana.

Barriers

- C Need enforcement at the federal and state level where buy recycled mandates exist.
- C Buy recycled reporting to authorities, including state management and the public.
- C Misperceptions on price, performance, and availability of recycled-content products.
- C Lack of awareness of recycled-content products, including through state contracts for local governments.
- C Discriminating specifications.
- C Failure to enforce existing buy-recycled mandates.
- C Purchasing manager ignorance in public and private sector.

Opportunities

- C Extending state mandates to contractors and other decision makers.
- C Educating and training National Association of Purchasing Managers on the value of buying recycled and how to buy recycled.
- C Promoting recycled-content products and providing business and technical assistance to help businesses grow.
- C Training purchasers to upgrade specifications to remove discrimination against recycled-content products.
- C Linking JTR with the Buy Recycled Business Alliance.
- C Targeting select product categories each year to allow for focused approach.
- C Encouraging businesses and government agencies to buy products made from their own waste stream.
- C Considering expanding the JTR list server to the private sector.
- C Consolidating or linking various states' buy recycled online directories.
- C Facilitating each state's adoption of one major industry or business to encourage them to buy recycled.
- C Establishing new or promoting existing cooperative purchasing programs.

Group #8: Information Assistance

- C The group discussed possible database fields for EPA's project to develop a database of recycling market development resources.
- C The group also identified the following as "hot topics": plastic lumber, incentives, food waste, green building, global climate change, pollution prevention, reuse, and electronics.
- C Guidance is needed regarding what types of information should be given out domestically versus internationally by information providers. As a related issue, the group discussed whether foreign industry is underselling U.S. recycling remanufacturers.